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## Growth Accelerations and Regime Changes: A Correction

RICHARD JONG-A-PIN<sup>1</sup> AND JAKOB DE HAAN<sup>1,2</sup>

### ABSTRACT

**A COMMENT ON:** RICARDO HAUSMANN, LANT PRITCHETT, AND DANI RODRIK, “GROWTH ACCELERATIONS,” *JOURNAL OF ECONOMIC GROWTH* 10(4), 2005: 303-329.

**THERE IS MUCH RESEARCH ON THE IMPACT OF POLITICAL, LEGAL, AND ECONOMIC** institutions on long term economic growth. The usefulness of the growth regression framework is questionable, however, as it assumes that a single linear model is appropriate for all countries at all times (De Haan 2007). Very few countries have experienced consistently constant growth rates over time. Pritchett (2000) documents, for instance, that the variation in growth rates within countries is large relative to both the average growth rates and the variance across countries. Likewise, Jones and Olken (2005) report that no less than 48 countries have experienced one or more structural breaks in their economic development. These breaks lead to very distinct growth patterns. Whereas some countries have sustained long periods of growth, others have experienced rapid growth followed by stagnation or even crisis. Still others have faced continuous stagnation or steady decline. Empirical growth research has underestimated the importance of instability and volatility in growth rates, especially in developing countries.

One promising research strategy is to examine the economic, political, institutional, and policy conditions that accompany changes in growth patterns. A pioneering contribution in this field is by Hausmann, Pritchett and Rodrik (2005)—abbreviated here as HPR. They examine whether political regime changes and economic reforms precede growth accelerations. They identify more than 80

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1 Faculty of Economics and Business, University of Groningen, The Netherlands 9700 AV.

2 CESifo, Munich, Germany.

We would like to thank Dani Rodrik for providing the data used in the analysis.

growth accelerations since the 1950s, which tend to be highly unpredictable. They find that a political regime change increases the probability of a growth acceleration by 5.3 percentage points while economic reforms are not related to growth accelerations. Their approach has attracted much attention and some recent papers have followed their approach (see, e.g., Doern and Nunnenkamp 2007).

We argue that these conclusions of HPR are wrong as these authors were led astray by a data-description error in the Polity IV manual. When we correct for the error and stick to the Polity IV definition of regime change, we find that political regime changes are not related to the probability that a growth acceleration occurs. We also find some evidence that economic liberalization increases the probability of a growth acceleration (sustained or otherwise).

Our work can be seen as an illustration of the importance of replication as stressed by Hamermesh (2007). This paper contains a particular form of replication, namely redoing an analysis as published in a major journal using the data as used in that analysis to check whether the conclusions drawn are correct.

### OUR REPLICATION

For the period 1957-1992, HPR identify 83 periods of accelerated growth, using the following filter. For each country (with more than 1 million inhabitants and more than 20 available observations) the logarithm of real GDP per capita (taken from the Penn World Tables 6.1.) is regressed on time for every eight-year period ( $n=7$ ). That is,

$$\ln(y_{t+i}) = a + g_{t,t+n} * t + \varepsilon, \quad i= 0, \dots, n$$

Where  $y$  denotes real GDP capita and  $t$  is time. The estimated parameter,  $g_{t,t+n}$ , is taken as a proxy for the average growth rate over the period  $t$  to  $t+n$  and labeled the “least squares growth rate”. To qualify as a growth acceleration, the least squares growth rate must be at least 3.5% per annum. Furthermore, it must be at least 2 percentage points higher than in the previous eight years. Finally, to rule out episodes of full economic recovery, the level of real GDP must be higher at the end of the acceleration than in all years before the acceleration. In cases in which consecutive years qualify to be the start of a growth acceleration, the year is chosen with the highest F-statistic of a piecewise linear (or spline) regression with the break at the relevant year. HPR allow for the possibility that an acceleration is followed by another acceleration as long as the second acceleration starts at least five years after the first one.

We base our analysis on the definition and the identification of growth accelerations of HPR—though we feel the definition could be improved upon—and

focus on the explanatory variables used by these authors. These are categorized under three headings.

- (i) *External shocks.* Growth accelerations may be triggered by favorable external conditions, and HPR therefore include a terms-of-trade dummy, which takes the value 1 whenever the change in the terms of trade from year  $t-4$  to  $t$  is in the upper 10 percent of the entire sample.
- (ii) *Economic reform.* To quantify a change in economic policy, the authors rely primarily on an index provided by Wacziarg and Welch (2003), which incorporates a number of structural features (e.g., presence of marketing boards and socialist economic regimes) and the macroeconomic environment (e.g., presence of a large black-market premium for foreign currency), in addition to tariff and non-tariff barriers to trade. The variable used is a dummy that takes the value of 1 during the first five years of a transition towards “openness”.
- (iii) *Political regime changes* are proxied by a dummy that takes a value of 1 in the 5-year period beginning with a regime change as recorded in the Polity IV dataset (Marshall and Jaggers 2002), where a regime change is defined as a three-unit change in the Polity score (or as a regime interruption).

Professor Rodrik kindly provided the data used by HPR. We were able to reproduce their findings (results available on request). However, we discovered that HPR were led astray by the description in the Polity IV manual of the variable they used to construct their political regime change dummy.<sup>3</sup> As a consequence, in the dataset of HPR the political regime change dummy takes a value of 1 whenever there is a *one-unit change* (or more) in the Polity score.<sup>4</sup> This is not in line with the definition of a political regime change as outlined above. We have corrected this error and examine whether the results change.

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3 HPR assume that a regime change occurs whenever the Polity IV data provides a non-missing value (including 0) for the variable REGTRANS. The error in the Polity manual is that on p. 26 it says: “Variables in Section 4 are coded only when there has been a change in regime authority characteristics that account for a 3-point change in the POLITY score or the assignment of a Standard Authority Code (“-66”, “-77”, or “-88”).” This is not correct as the variables in section 4 are coded for *any* change in the POLITY score or the assignment of a Standard Authority code. The quoted sentence should read so as to include the following words in bold type: “Variables in Section 4 are coded **and, in the case of REGTRANS, non-zero** only when...” In a telephone conversation with Daniel Klein, Montgomery Marshall, author of the Polity IV manual confirmed this understanding. The REGTRANS variable may be used to identify regime changes by excluding REGTRANS=0 observations. Marshall confirmed that it is erroneous to count REGTRANS=0 observations as regime changes.

4 A good example is Egypt 1976 that is coded 0 in the REGTRANS column *merely* because that year experienced a one-point change in the POLITY score. As a consequence, HPR erroneously treat this observation as a regime change. If HPR had checked their regime change variable with the Polity IV data series, they would have discovered that observations with REGTRANS=0 are not instances of regime change as they (HPR) defined them.

Table 1 shows the relationship between growth accelerations and regime changes (cf. Table 7 of HPR 2005, 320):

- Of 83 accelerations, we find that *21.7 percent*, are preceded or accompanied by a regime change, whereas HPR had *50 percent*.
- Of 130 regime changes, 13.8 percent, are followed by a growth acceleration, whereas HPR had 13.9 percent. And 4.6 percent, are followed by sustained accelerations, whereas HPR had 8.5 percent.

**Table 1: Regime Changes and Growth Accelerations**

	#	Acceleration and regime change in the same years (overlap)
Regime changes in the sample	130	
Growth accelerations	83	18
Sustained growth accelerations	32	6
% of accelerations accompanied or preceded by regime change	21.7%	
% of sustained accelerations accompanied or preceded by regime change	18.8%	
% of regime changes that result in acceleration	13.8%	
% of regime changes that result in sustained acceleration	4.6%	

Using the dataset as provided by Rodrik, we were able to fully reproduce Table 8 of HPR (322), in which they report on the relationship between the probability of a growth acceleration and a political regime change. As the first step in our subsequent analysis we corrected the coding mistake of political regime changes. Next, we checked the econometric specification of HPR. If we test for the restriction that all time dummies equal zero, it is not rejected for the model specifications as reported in columns (1)-(9). Therefore, we omit the time dummies for those specifications, but include them in columns 10 and 11. Table 2 reports our results if we redo the regressions in Table 8 of HPR using the corrected regime change variable and taking time dummies into account.<sup>5</sup> Our results diverge substantially from those of HPR. Whereas the latter report that regime changes have a highly significant impact on the probability of the occurrence of a growth acceleration, our evidence suggests that, in

<sup>5</sup> We use the Polity IV dataset in constructing our regime change dummy. The number of observations in our Table 2 differ from those in Table 8 of HPR as the dataset of HPR provide data for some countries for which the Polity IV does not provide data.

**Table 2: Predicting Growth Accelerations  
(Dependent Variable is a Dummy for the Timing of Growth Accelerations)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
TOI_thresh90	0.039 (2.15)**	0.040 (2.21)**	0.040 (2.18)**	0.037 (2.10)**	0.035 (2.20)**	0.032 (2.10)**	0.032 (2.11)**	0.033 (2.15)**	0.038 (2.15)**		
Econ Lib	0.039 (1.78)*	0.043 (1.93)*	0.040 (1.84)*	0.040 (1.83)*	-0.007 (0.39)	-0.014 (0.80)	-0.014 (0.79)	-0.014 (0.78)	0.040 (1.86)*	0.031 (1.55)	0.032 (1.59)
Xregchange	0.024 (1.66)*									0.011 (0.87)	
Xposchange		-0.001 (0.04)	-0.000 (0.02)	0.001 (0.03)	0.002 (0.10)	0.000 (0.01)	0.000 (0.02)	0.000 (0.03)	0.002 (0.11)		0.007 (0.32)
Xnegchange		0.028 (1.22)	0.027 (1.17)	0.028 (1.20)	0.023 (1.21)	0.021 (1.18)	0.021 (1.16)	0.023 (1.25)	0.027 (1.19)		0.009 (0.42)
Leader Death			-0.030 (1.20)	-0.062 (1.94)*	0.000 (0.00)	0.000 (0.01)	0.001 (0.01)	0.001 (0.02)	0.001 (0.02)		-0.062 (1.92)*
Tenure				0.006 (1.98)**	-0.045 (3.06)**	-0.048 (3.00)**	-0.048 (3.00)**	-0.048 (3.00)**	0.006 (1.95)*		
War End							0.002 (0.16)	0.010 (0.59)	0.027 (1.28)		
Civil War								-0.019 (0.82)	-0.017 (0.64)		
Finance					0.035 (1.64)	0.114 (2.85)**	0.113 (2.85)**	0.116 (2.90)**			
Finance Dev						-0.044 (2.28)**	-0.044 (2.28)**	-0.044 (2.34)**			
Observations	2094	2094	2094	2094	1891	1891	1891	1891	2094	2739	2739
Pseudo R-squared	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.04	0.04
Time dummies equal 0, prob> Chi^2	0.7667	0.7670	0.7725	0.6986	0.5015	0.5648	0.5519	0.561	0.6861	0.0048	0.005
Time dummies included	No	No	No	No	No	No	No	No	No	Yes	Yes
Robust z statistics in parentheses	* significant at 10%; ** significant at 5%; *** significant at 1%										

general, regime changes are hardly related to growth accelerations. For instance, HPR find a coefficient of regime instability of 0.044 and a t-statistic of 4.16. If we correct the error in the regime change data of HPR, we find instead, as reported in column 10 of Table 2, a coefficient of 0.011 and a t-statistic of 0.87. Likewise, whereas HPR find that the coefficients of positive and negative regime changes ( $X_{poschange}$  and  $X_{negchange}$ , respectively) are generally highly significant, these variables are never significantly related to the probability of a growth acceleration according to our results. Furthermore, in our regressions the economic liberalization variable ( $Econ Lib$ ) becomes significant at the 10 percent level, whereas HPR find that this variable is always insignificant.<sup>6</sup> The results for the other variables are similar to those of HPR.

We also examined the determinants of sustained and unsustained growth accelerations, while liberalization is significant. Table 3 reports the results when we estimate the models given in Table 12 of HPR. Again, we find that political regime changes are unrelated to growth accelerations. All other results are similar to the findings of HPR.

**Table 3. Predicting sustained and unsustained growth accelerations**  
(Dependent variable is a dummy for the timing of growth accelerations)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	All	Sustained	Sustained	Sustained	Unsustained
TOT_thresh90	0.067	0.074	0.019	0.016		0.023
	(2.80)***	(3.25)***	(1.35)	(1.22)		(3.67)***
Econ Lib	0.090	0.093		0.140	0.091	
	(1.98)**	(2.08)**		(3.94)***	(3.50)***	
Xposchange	-0.012	-0.008	0.010	0.015	0.013	-0.002
	(0.33)	(0.23)	(0.44)	(0.66)	(0.65)	(0.40)
Xnegchange	0.046	0.050	0.017	0.019	0.011	0.005
	(1.76)*	(1.92)*	(1.04)	(1.18)	(0.63)	(1.20)
Finance	-0.006					0.994
	(0.17)					(8.15)***
Observations	1211	1300	1300	1300	1723	1140
Pseudo R-squared	0.02	0.03	0.01	0.05	0.12	0.11
Time dummies equal 0, prob > Chi <sup>2</sup>	0.2254	0.3175	0.9793	0.9794	0.0001	0.0000
Time dummies included	No	No	No	No	Yes	Yes
Robust z statistics in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%						

<sup>6</sup> If we estimate the models with time dummies, we find that the political regime change dummy (properly defined) remains insignificant, and that economic liberalization does not significantly explain the occurrence of an acceleration.

## CONCLUSIONS

Economists treat replication the way teenagers treat chastity—as an ideal to be professed but not to be practiced (Hamermesh 2007, 1).

HPR's finding that a political regime change increases the probability of an economic growth acceleration is wrong and the result of a data error. When we correct for this error and stick to the definition of political regime change as a three-unit change in Polity, we find that regime changes do not affect the probability that a growth acceleration occurs. We also find some evidence that economic liberalization increases the probability of a growth acceleration (sustained or otherwise).

The paper by HPR appeared as a National Bureau of Economic Research working paper in 2004 (#10566) and as an article in the *Journal of Economic Growth* in 2005. As of October 2007, the paper had received 22 citations, as recorded in Thomson-ISI's Social Science Citation Index. We have not examined those 22 articles, but it is quite possible that some or many of them have cited HPR as support for the idea that a political regime change is correlated with an economic growth acceleration.<sup>7</sup>

The work represented here was submitted, of course, to the *Journal of Economic Growth*, although in that version of the paper we had not yet pinpointed the data-description error in the Polity IV manual. The paper was rejected on the basis of the argument that our note is a “welcome correction, however, of limited significance for the main contribution of the original paper.” However, in their abstract, HPR state that one of their main conclusions is that “Political regime changes are statistically significant predictors of growth accelerations.”

Coelho, de Worken-Eley III, and McClure (2005) document the decline in critical commentary at top economics journals. Our experience indicates that editors are not even willing to publish corrections of serious errors.

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<sup>7</sup> Dovern and Nunnenkamp (2007) also use Polity IV data and also find a significant impact of regime changes on the likelihood that a growth acceleration occurs. As they do not very precisely describe their regime change variables, it is not clear whether their work suffers from the same error that HPR's does.

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#### ABOUT THE AUTHORS



**Richard Jong-A-Pin** obtained his MSc. in Economics in 2003 from the University of Groningen, The Netherlands, where he is currently a PhD student. His research focus lies in political economy—especially the causes and consequences of political instability. His work has been or will be published in the *European Economic Review*, *Economics Letters*, *Public Choice*, and other journals. His email address is [r.m.jong.a.pin@rug.nl](mailto:r.m.jong.a.pin@rug.nl).



**Jakob de Haan** is Professor of Political Economy, University of Groningen, The Netherlands. He is also director of SOM, the research institute and graduate school of the faculty of Economics and Business of the University of Groningen. He is also editor of the *European Journal of Political Economy*. His email address is [Jakob.de.Haan@rug.nl](mailto:Jakob.de.Haan@rug.nl).

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